



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/633,615	08/05/2003	Masayuki Tanaka	04329.3104	5383
22852	7590	03/09/2006	EXAMINER	
FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER LLP 901 NEW YORK AVENUE, NW WASHINGTON, DC 20001-4413			BRYANT, DELORIS S	
			ART UNIT	PAPER NUMBER
			2813	

DATE MAILED: 03/09/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

H.A

Office Action Summary	Application No. 10/633,615	Applicant(s) TANAKA, MASAYUKI	
	Examiner Deloris Bryant	Art Unit 2813	

– The MAILING DATE of this communication appears on the cover sheet with the correspondence address –
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 December 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-6 and 8-20 is/are pending in the application.
 4a) Of the above claim(s) 9-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3-6 and 8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 December 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>11/8/05</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Applicant's response to non-final rejection dated December 20, 2005 is acknowledged.

Drawings

Objections to the drawings have been overcome based on applicant's amendments and are hereby acknowledged.

Claim Objections

Objections to the informalities in claim 5 have been overcome based on applicant's amendments and are hereby acknowledged.

Claim Rejections - 35 USC § 112

Examiner withdraws the rejection of claim 6 as the applicant has clarified any indefiniteness or antecedent basis issues.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1, 3, 5 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsubara (US 6,271,594) in view of Tanaka et al (US 6,333,547). Matsubara discloses a semiconductor substrate (fig. 4; 101); source/drain regions (fig. 4; 106) provided on a channel region between the source/drain regions (fig. 4; 106); a gate electrode (fig. 4; 104) provided on the gate insulating film (fig. 4; 103); a conductive layer of a metal silicide (fig. 4; 108) provided on the gate electrode (fig. 4; 104) and the source/drain regions (fig. 4; 106); the conductive layer (fig. 4; 108); and an interlayer insulating film provided on the semiconductor substrate (fig. 4; 101). Matsubara fails to disclose an insulating film containing carbon, silicon nitride and chlorine. Tanaka teaches an insulating film containing carbon, silicon nitride and chlorine (Fig. 25B; 411; Co. 28, lns 29-39). It would have been obvious to one of ordinary skill in the art at the time of applicant's invention to use the insulating film specified by Tanaka as the insulating film of Matsubara. One would have been motivated to so modify Matsubara to form a film at a low temperature not higher than 700° C.

Regarding claims 3 and 8, the prior art of Matsubara and Tanaka teach the device of claim 1 as described above. Matsubara does not disclose an insulating film is mainly silicon nitride or the concentration of carbon, chlorine or hydrogen. Tanaka teaches the carbon concentration in an insulating film is to be at least $4 \times 10^{20} \text{ cm}^{-3}$ (col. 28, line 33-34) (claim 3) and the hydrogen concentration is $5 \times 10^{21} \text{ cm}^{-3}$ (col. 28, lns 27-29) (claim 8). It would have been obvious to one of ordinary skill in the art at the time of applicant's invention to use a silicon nitride layer specified by Tanaka as the insulating

Art Unit: 2813

film of Matsubara. One would have been motivated to so modify Matsubara to decrease the parasitic capacitance of the interlayer insulating film (col. 30, Ins 5-6). By doing so, the "RC delay resistance" is diminished thus improving the characteristics of the device (col. 30, Ins 44-45).

Regarding claim 5, the prior art of Matsubara and Tanaka teach the device of claim 1 as described above. Furthermore, Matsubara discloses a metal of the metal silicide is at least one selected from a group consisting of tantalum, cobalt, titanium, molybdenum, hafnium, tungsten, platinum and palladium (col. 6, Ins 64-65).

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Matsubara (US 6,271,594) in view of Tanaka et al (US 6,333,547) and in further view of Konuma et al. The prior art of Matsubara and Tanaka teach the device of claim 1 as described above. Furthermore, Matsubara discloses a titanium film (col. 6, Ins 57-67). Matsubara or Tanaka, however, does not disclose nickel as one of the options for the metal layer. Konuma et al teaches a metal film made with titanium and also teaches that in place of titanium other metals may be used instead, which nickel is one of those other metals. It would have been obvious to one of ordinary skill in the art at the time of applicant's invention to replace the titanium with nickel. One would have been motivated to so modify Matsubara and Tanaka with any of the other metals to provide a stable interface (col. 9, line 65).

Art Unit: 2813

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Matsubara (US 6,271,594) in view of Tanaka et al (US 6,333,547) and in further view of Park (US 5,795,808). The prior art of Matsubara and Tanaka teach the device of claims 1 and 5 as described above. Furthermore, Matsubara discloses a metal of the metal silicide is at least one selected from a group consisting of tantalum, cobalt, titanium, molybdenum, hafnium, tungsten, platinum and palladium (col. 6, Ins 64-65). Both Matsubara and Tanaka fail to teach wherein the metal of the metal silicide has a stacked structure composed of a plurality of different metal layers. Park, however, does teach multiple silicide layers of different metals (Col. 4, Ins 59-63). It would have been obvious to one of ordinary skill in the art at the time of applicant's invention to employ multiple metal silicide for the metal silicide stacked structure. One would have been motivated to so modify Matsubara and Tanaka so that the multiple layers may.

Response to Amendment

Applicant's arguments with respect to claims 1, 3-6 and 8 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Deloris Bryant whose telephone number is (571) 272-8670. The examiner can normally be reached on M-F 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2813

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

dsb



CARL WHITEHEAD, JR.
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800